based on the IEEE 1394 standard by at least one type of cable selected from the group consisting of an optical-fiber cable, an unshielded-twisted pair (UTP) cable and a stand-alone cable comprising only one shielded-twisted pair (STP) cable;

allocating periodic bit regions which are not used at a low data rate to transfer data in a data packet to be transmitted, on a data stream by transmitting data bits at said low data rate only in predetermined portions of periodic intervals of said data stream, without transmitting any data during the allocated periodic bit regions, so as to facilitate a change in data communication to communication at higher data rates defined by the IEEE 1394 standard; and,

communicating data between said electronic devices.--

--16. The method of Claim 15, further comprising the step of transmitting data rates by sending at least one type of predetermined speed-control symbol via a data stream.--

--17. A data communication method in a data communication system with a variable data rate and having an interface to perform data communication among a plurality of electronic apparatuses, wherein a cable defined in said data-communication system is normally used in said data communication system, said method comprising the steps of:

communicating data using an arrangement of bits corresponding to a maximum data rate, when a communication channel for performing data communication among said plurality of electronic apparatuses using a multi-purpose cable different from said cable defined

in said data-communication system is used; and

allocating on a data stream periodic bit regions not used to transfer data in a data packet when said multi-purpose cable is used to perform the data communication at a low data rate, by transmitting data bits at said low data rate only in predetermined portions of periodic intervals of said data stream, without transmitting any data during the allocated periodic bit regions, so as to facilitate a change in data communication to higher data rate communication.--

--18. The method of Claim 17, further comprising the step of sending one or more types of predetermined speed control symbols by means of said data stream in order to transmit said data rates.--

--19. The method of Claim 17, further comprising the step of providing a bias effect, defined in said data-communication system, to said cable by transmitting a predetermined control symbol on said multi-purpose cable, said bias effect used to detect one of said apparatuses connected to another of said apparatuses.--

--20. The method of Claim 19, further comprising the step of sending, when said predetermined control symbol has a relatively strong signal change, a control symbol with small signal change to weaken unnecessary radiation.--

--21. A data communication method comprising the steps of:

connecting a plurality of electronic devices provided with a communication interface based on the IEEE 1394 standard by at least one type of cable selected from the group consisting of an optical-fiber cable, an unshielded-twisted pair (UTP) cable and a stand-alone cable comprising only one shielded-twisted pair (STP) cable;

providing a Tp bias effect on said at least one type of cable by transmitting predetermined symbols thereon, said Tp bias effect being used to detect one of said devices being connected to another of said devices.--

A6 cont.

--22. The method of Claim 21, wherein said Tp bias effect is provided by transmitting a continuous stream of predetermined symbols to represent a condition of Tp bias being on.--

--23. The method of Claim 21, wherein the predetermined control symbols exhibit small signal change in order to limit unnecessary radiation in said UTP or said STP cables.--

--24. An electronic apparatus adapted to transmit and receive data over a serial data bus, said apparatus comprising:

a first terminal operably connectable to an IEEE 1394 serial bus cable having two twisted pairs;

a second terminal operably connectable to a multi-purpose cable for use as at least part of

said serial data bus when operably connected to said second terminal, said multi-purpose cable selected from the group consisting of an optical-fiber cable, an unshielded-twisted pair (UTP) cable, and a stand-alone cable comprising only one shielded-twisted pair (STP) cable;

an IEEE 1394 physical-layer protocol logic section operative to perform serial data bus initialization and arbitration;

a first conversion section connected between said logic section and said first terminal to convert signals transmitted and received between said serial bus cable and said logic section; and

a second conversion section connected between said second terminal and said logic section to convert signals transmitted and received to and from said logic section and said optical-fiber, UTP or stand-alone cable.--

--25. The electronic apparatus of Claim 24 wherein,

said second terminal is operably connectable to said multi-purpose cable selected from the group consisting of said UTP cable and said stand-alone cable;

said first conversion section comprises a DS coding section and a first signal level adjustment section; and

said second conversion section comprises a code conversion section, a multilevel transmission –3 (MLT-3) section for performing MLT-3 coding of data to be transmitted on said UTP cable or stand-alone cable, and for performing MLT-3 reverse conversion of data received from said UTP or stand-alone cable, and a second signal level adjustment section.--

--26. The electronic apparatus of Claim 25, wherein said code conversion section is a m bit to n bit conversion section for performing m bit to n bit conversion of data to be transmitted from said apparatus on said UTP or stand-alone cable and n bit to m bit conversion of data received by said apparatus from said UTP or stand-alone cable.--

A6 cont.

--27. The electronic apparatus of Claim 24 wherein,

said multi-purpose cable is said fiber optic cable, and said second terminal operably connects to said optical-fiber cable via an electro-optical converter;

said first conversion section comprises a DS coding section and a first signal level adjustment section; and

said second conversion section comprises a code conversion section, a NRZI coding section and a second signal level adjustment section.--

--28. The electronic apparatus of Claim 27, wherein said code conversion section is a m bit to n bit conversion section for performing m bit to n bit conversion of data to be transmitted from said apparatus on said optical-fiber cable and n bit to m bit conversion of data received by said apparatus from said optical-fiber cable.--

--29. The electronic apparatus of Claim 24 wherein,

said first conversion section comprises a DS coding section and a first signal level adjustment section;

said second conversion section comprises:

a code conversion section connected to said logic section;

a multilevel transmission –3 (MLT-3) section for performing MLT-3 coding of data to be transmitted on said UTP cable or stand-alone cable, and for performing MLT-3 reverse conversion of data received from said UTP or stand-alone cable, and a second level adjustment section;

a NRZI coding section for coding data transmitted on and received from said optical-fiber cable; and

switching means for switching to said NRZI section when said optical-fiber cable is operably connected to said second terminal and to said MLT-3 section when said UTP or stand-alone cable is operably connected to said second terminal.--

--30. The electronic apparatus of Claim 29, further comprising a connector detector for detecting the type of connector connected to said second terminal, said connector detector controlling switching states of said switching means based on the connector type detected.--

--31. The electronic apparatus of Claim 24, wherein connection of said second terminal to said UTP or stand-alone cable is made through an insulating transformer, and connection of said

second terminal to said optical-fiber cable is made through an electro-optical converter.--

--32. An electronic apparatus adapted to transmit and receive data over a serial data bus, said apparatus comprising:

a first terminal operably connectable to a serial bus cable having two twisted pairs;

a second terminal operably connectable to a multi-purpose cable for use as at least part of said serial data bus when operably connected to said second terminal, said multi-purpose cable selected from the group consisting of an optical-fiber cable, an unshielded-twisted pair (UTP) cable, and a stand-alone cable comprising only one shielded-twisted pair (STP) cable;

a physical-layer protocol logic section operative to perform serial data bus initialization and arbitration;

a first conversion section connected between said logic section and said first terminal to convert signals transmitted and received between said serial bus cable and said logic section; and

a second conversion section connected between said second terminal and said logic section to convert signals transmitted and received to and from said logic section and said optical-fiber, UTP or stand-alone cable.--

--33. The electronic apparatus of Claim 32 wherein,

said second terminal is operably connectable to said multi-purpose cable selected from the group consisting of said UTP cable and said stand-alone cable;

said first conversion section comprises a DS coding section and a first signal level adjustment section; and

said second conversion section comprises a code conversion section, a multilevel transmission –3 (MLT-3) section for performing MLT-3 coding of data to be transmitted on said UTP cable or stand-alone cable, and for performing MLT-3 reverse conversion of data received from said UTP or stand-alone cable, and a second signal level adjustment section.--

--34. The electronic apparatus of Claim 33, wherein said code conversion section is a m bit to n bit conversion section for performing m bit to n bit conversion of data to be transmitted from said apparatus on said UTP or stand-alone cable and n bit to m bit conversion of data received by said apparatus from said UTP or stand-alone cable.--

--35. The electronic apparatus of Claim 32 wherein,

said multi-purpose cable is said optical-fiber cable, and said second terminal is operably connectable to said optical-fiber cable via an electro-optical converter;

said first conversion section comprises a DS coding section and a first signal level adjustment section; and

said second conversion section comprises a code conversion section, a NRZI coding section and a second signal level adjustment section.--

--36. The electronic apparatus of Claim 35, wherein said code conversion section is a m bit to n bit conversion section for performing m bit to n bit conversion of data to be transmitted from said apparatus on said optical-fiber cable and n bit to m bit conversion of data received by said apparatus from said optical-fiber cable.--

--37. The electronic apparatus of Claim 32 wherein,

said first conversion section comprises a DS coding section and a first signal level adjustment section;

said second conversion section comprises:

a code conversion section connected to said logic section;

a multilevel transmission –3 (MLT-3) section for performing MLT-3 coding of data to be transmitted on said UTP cable or stand-alone cable, and for performing MLT-3 reverse conversion of data received from said UTP or stand-alone cable, and a second level adjustment section;

a NRZI coding section for coding data transmitted on and received from said optical-fiber cable; and

switching means for switching to NRZI section when said optical-fiber cable is connected to said second terminal and said MLT-3 section when said UTP or stand-alone cable is connected to said second terminal.--

--38. The electronic apparatus of Claim 29, further comprising a connector detector for detecting the type of connector connected to said second terminal, said connector detector controlling switching states of said switching means based on the connector type detected.--

--39. The electronic apparatus of Claim 32, wherein connection of said second terminal to said UTP or stand-alone cable is made through an insulating transformer, and connection of said second terminal to said optical-fiber cable is made through an electro-optical converter.--

--40. An integrated circuit formed in a physical layer based on an interface adapted for a serial data bus data-communication system that has a variable data rate, wherein said integrated circuit comprises:

a first terminal operably connectable to a serial bus cable having two twisted pairs;

a second terminal operably connectable to a multi-purpose cable for use as at least part of said serial data bus when operably connected to said second terminal, said multi-purpose cable selected from the group consisting of an optical-fiber cable, a UTP cable and a stand-alone cable comprising only one STP cable;

a physical-layer protocol logic section operative to perform serial data bus initialization and arbitration;

a first conversion section connected between said logic section and said first terminal to convert signals transmitted and received between said serial bus cable and said logic section; and